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2010年4月1日
瑞萨电子公司

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晶闸管/双向晶闸管

文字符号的说明

1. 普通功率半导体器件

符号	项目	定义或说明
R_{th}	热阻	表示由结的功耗使热流处于平衡状态时，结温与外部的指定点相比，每单位功率上升几度的值。
$R_{th(j-a)}$	结/周围环境之间的热阻	由结到周围环境的热阻。
$R_{th(j-c)}$	结/外壳之间的热阻	由结到外壳的热阻。
$R_{th(j-f)}$	结/散热板之间的热阻	由结到散热板的热阻。
$R_{th(c-f)}$	接触热阻 （外壳/散热板之间的热阻）	由外壳到散热板的热阻。
Z_{th}	瞬态热阻	表示在外壳温度 （柱螺栓温度）或者环境温度一定的情况下，结的功耗处于脉冲状态时，结温与外部的指定点相比，每单位功率上升几度的值。
$Z_{th(j-a)}$	结/周围环境之间的 瞬态热阻	由结到周围环境的瞬态热阻。
$Z_{th(j-c)}$	结/外壳之间的 瞬态热阻	由结到外壳表面的瞬态热阻。
$Z_{th(j-f)}$	结/散热板之间的 瞬态热阻	由结到散热板的瞬态热阻。
T_a	环境温度	表示在自冷或者风冷的方式下使用时，不受发热体影响时的空气温度。
T_f	散热板温度	在用于半导体器件的散热板上规定的1个点的温度。
T_c	外壳温度	在半导体器件的外壳上规定的一个点的温度。
T_j	额定结温	作为额定标准规定的器件结温，以器件运行中的最高容许温度与最低容许温度表示。
T_{stg}	额定保存温度	在不外加功率的状态下能够保存半导体器件的温度，以最高容许温度与最低容许温度表示。

2. 晶闸管

符号	项目	定义或说明
V_{RRM}	额定反向重复峰值电压	在额定结温范围内不向栅极 / 阴极之间输入信号的状态下，每个周期可外加的反向重复峰值电压。 小功率器件中，在栅极 / 阴极之间连接指定的电阻。
V_{RSM}	额定反向不重复峰值电压	在额定结温范围内不向栅极 / 阴极之间输入信号的状态下，可外加不超过相当于工业用电频率正弦半波时限的反向不重复峰值电压。 小功率器件中，在栅极 / 阴极之间连接指定的电阻。
$V_{R(DC)}$	额定直流反向电压	在额定结温范围内不向栅极 / 阴极之间输入信号的状态下，在器件的反向上可外加的直流电压的最大值。
V_{DRM}	额定断态重复峰值电压	在额定结温范围内不向栅极 / 阴极之间输入信号的状态下，每个周期可外加的断态重复峰值电压。断态重复峰值电压是指，在施加到器件的断态电压中，除不重复过渡电压外，包含重复过渡电压的断态电压的瞬时最大值。 小功率器件中，在栅极 / 阴极之间连接指定的电阻。
V_{DSM}	额定断态不重复峰值电压	在额定结温范围内不向栅极 / 阴极之间输入信号的状态下，可外加不超过相当于工业用电频率正弦半波时限的断态不重复峰值电压。断态不重复峰值电压是指，在施加到器件的断态电压中，不重复过渡电压的瞬时最大值。 小功率器件中，在栅极 / 阴极之间连接指定的电阻。
$V_{D(DC)}$	额定直流断态电压	在额定结温范围内不向栅极 / 阴极之间输入信号的状态下，可在器件正向上外加的直流电压最大值。 小功率器件中，在栅极 / 阴极之间连接指定的电阻。
dv/dt	断态电压临界上升率	在额定最高结温下不向栅极 / 阴极之间输入信号的状态下，不从断开状态转换到接通状态的最大断态电压（有指定振幅的指数函数状外加断态电压）的上升率。 $\frac{dv}{dt} = \frac{0.632V_D}{\tau}$ 此处， V_D：指定的断态电压 τ：指数函数波形的时间常数 小功率器件中，在栅极 / 阴极之间连接指定的电阻。
V_{TM}	通态电压	在指定的外壳（或者指定的点）温度下，通入有指定振幅的工业用电频率的正弦半波通态电流时，产生的电压下降峰值。
$I_{T(RMS)}$	额定有效通态电流	在指定的外壳（或者指定的点）温度下，可连续通入器件的通态电流的有效值。
$I_{T(AV)}$	额定平均通态电流	在指定的外壳（或者指定的点）温度、电阻负载或者感性负载下，可正向连续通入的工业用电频率的正弦半波（180 度导通）电流的平均值。
I_{TSM}	额定电涌通态电流	在额定结温的范围内可通入的不重复性工业用电频率的正弦半波通态电流的峰值。 该值表示 1 个周期的值或者周期数的函数。
I^2t	额定电流平方时间积	在半个周期的期间内对额定电涌电流作为峰值的正弦半波电流的平方进行时间积分的值。 $I^2t = \int_0^{\frac{\pi}{\omega}} I_{TSM}^2 \sin^2 \omega t \, dt$

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符号	项目	定义或说明
di/dt	额定通态电流临界上升率	在指定的外壳 （或者指定的点）温度、指定的断态电压、指定的栅极条件以及小于等于60Hz的频率下，晶闸管由断开状态转换为接通状态时，晶闸管能够承受的最大通态电流上升率。
I_H	保持电流	在指定的结温、栅极条件以及断态电压下，维持晶闸管接通状态所必须的最小阳极电流。
I_L	闭锁电流	在指定的结温、断态电压以及栅极条件下，由断开状态转换到接通状态后立即除去栅极触发电流后，保持晶闸管接通状态所必须的最小阳极电流。
I_{RRM}	反向电流	在额定最高结温下，反向外加拥有与额定反向重复峰值电压相同峰值的工业用电频率的正弦半波电压时，通入的反向电流峰值。 小功率器件中，在栅极/阴极之间连接指定的电阻。
I_{DRM}	断态电流	在额定最高结温下，正向外加拥有与额定断态重复峰值电压相同峰值的工业用电频率的正弦半波电压时，通入的断态电流峰值。 小功率器件中，在栅极/阴极之间连接指定的电阻。
P_{GM}	额定栅极峰值损耗	在额定结温范围内，可在栅极/阴极之间正向上消耗的指定时限的最大容许功耗的峰值。
$P_{G(AV)}$	额定栅极平均损耗	在额定结温范围内，可在栅极/阴极之间的正向上消耗的最大容许功耗的平均值。
I_{FGM}	额定正向栅极峰值电流	在额定结温范围内，可在栅极/阴极之间正向通入的电流峰值。
V_{RGM}	额定反向栅极峰值电压	在额定结温范围内，可在栅极/阴极之间反向外加的电压峰值。
V_{FGM}	额定正向栅极峰值电压	在额定结温范围内，可在栅极/阴极之间正向外加的电压峰值。
I_{GT}	栅极触发电流	在结温为25°C、6V的断态电压和指定的负载电阻下，晶闸管由断开状态转换到接通状态所必须的最小栅极直流电流。不包含通入到与小功率器件连接的栅极电阻的电流。
V_{GT}	栅极触发电压	在结温为25°C、6V的断态电压和指定的负载电阻下，晶闸管由断开状态转换到接通状态所必须的最小栅极直流电压。
V_{GD}	栅极非触发电压	在额定最高结温、外加指定断态电压的状态下，不会发生由断开状态转换到接通状态的最大栅极直流电压。
$P_{T(AV)}$	通态损耗	通入指定导通角及电流波形的通态电流时，在1个周期内晶闸管内部所产生的功耗平均值。
t_{gt}	接通时间	在指定的结温下，外加1/2额定断态重复峰值电压之后，通入指定的栅极电流后就为接通状态，然后通入指定 di/dt 下的指定通态电流时，外加栅极电流后的外加断态电压下降至初始值的10%时所需时间。另外，把外加栅极电流后的外加电压降至初始值的 90% 时所需时间称为延迟时间，从 90% 降至 10% 所需要的时间称为上升时间。两者之和为接通时间。

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符号	项目	定义或说明
t_q	断开时间	在额定最高结温下，通入指定的通态电流后，外加指定的反向电压后通态电流被截止，接着按照指定的电压上升率提高断态电压，在达到指定的断态电压的电路条件下，从通态电流为零的瞬间再次外加正向电压后，能保持不转换为接通状态的最短时间。 电压 电流 tq 时间
Qrr	反向恢复电荷	是在指定的结温下，通入指定的通态电流后按照指定的电流减少率由接通状态转换到断开状态时，在器件内部积累的电荷；是从接通状态转换到断开状态时反向通入的反向恢复电流的时间积分值。

3. 双向晶闸管

符号	项目	定义或说明
V_{DRM}	额定断态重复峰值电压	在额定结温范围内，不向栅极/T1引脚之间输入信号的状态下，可外加的断态重复峰值电压。断态重复峰值电压是指，向器件双向施加的断态电压中，除不重复过渡电压外，包含重复过渡电压的电压瞬时最大值。
V_{DSM}	额定断态不重复峰值电压	在额定结温范围内，不向栅极/T1引脚之间输入信号的状态下，可外加不超过相当于工业用电频率正弦半波时限的断态不重复峰值电压。断态不重复峰值电压是指，在施加到器件的断态电压中，不重复过渡电压的瞬时最大值。
V_{TM}	通态电压	在分别双向通入具有指定外壳（或者指定的点）温度及指定振幅的工业用电频率的正弦半波电流时产生的通态电压中，是显示较大值方向的峰值。
$I_{T(RMS)}$	额定有效通态电流	在指定的外壳（或者指定的点）温度下，可连续通入的工业用电频率正弦波（360度导通）电流的有效值。
I_{TSM}	额定电涌通态电流	在额定结温范围内通入的不重复性工业用电频率正弦波电流的峰值。该值表示1个周期的值或者周期数的函数。
I^2t	额定电流平方时间积	在半个周期的期间内，对额定电涌通态电流作为峰值的正弦半波电流的平方进行时间积分的值。
di/dt	通态电流临界上升率	在指定的外壳（或者指定的点）温度、1/2额定断态重复峰值电压、指定的栅极条件以及不超过60Hz的频率下，双向晶闸管由断开状态转换为接通状态时，双向晶闸管能够承受的最大通态电流上升率。
dv/dt	断态电压临界上升率	在额定最高结温下，不向栅极/阴极之间外加信号的状态下，不从断开状态转换到接通状态的最大断态电压（有指定振幅的指数函数状外加断态电压）的上升率。 $\frac{dv}{dt} = \frac{0.632V_D}{\tau}$ 此处，V_D：指定的断态电压 τ：指数函数波形的时间常数
I_{DRM}	断态电流	在额定最高结温下，分别双向外加具有与额定断态重复峰值电压相同峰值的工业用电频率的正弦半波电压时，在通入的断态电流中，是显示较大值方向的峰值。
P_{GM}	额定栅极峰值损耗	在额定结温范围内，可在栅极/T1引脚之间的各自方向上消耗的指定时限的最大容许功耗的峰值。
$P_{G(AV)}$	额定栅极平均损耗	在额定结温范围内，可在栅极/T1引脚之间的各自方向上消耗的最大容许功耗平均值。
V_{GM}	额定栅极峰值电压	在额定结温范围内，可在栅极/T1引脚之间的双向上分别外加工业用电频率的正弦半波电压的峰值。
I_{GM}	额定栅极峰值电流	在额定结温范围内，可在栅极/T1引脚之间的双向上分别通入的工业用电频率的正弦半波电流的峰值。
V_{GT}	栅极触发电压	在结温为25°C、6V的断态电压和指定的负载电阻下，双向晶闸管由断开状态转换到接通状态所必须的最小栅极直流电压。根据T1引脚和栅极的极性，最多存在4种值。

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符号	项目	定义或说明
I_{GT}	栅极触发电流	在结温为25°C、6V的断态电压和指定的负载电阻下，双向晶闸管由断开状态转换到接通状态所必须的最小栅极直流电流。根据 T1 引脚和栅极的极性，最多存在4种值。
V_{GD}	栅极非触发电压	在额定最高结温、外加指定的断态电压状态下，不会发生从断开状态转换到接通状态的最大栅极直流电压。
$P_{T(AV)}$	通态损耗	通入有正弦波的指定导通角的通态电流时，在1个周期内双向晶闸管内部所产生功耗的平均值。
(dv/dt)c	转换时的断态电压临界上升率	在额定最高结温内，从通入指定通态电流的状态，在指定的电流减少率下减少电流并使其反转后，施加与前面导通方向相反的指定电压时，不会发生反向导通的最大断态电压上升率。是双向上的值中小的值。

修订记录

Rev.	发行日	修订内容	
		页	修订处
1.00	2008.01.30	—	初版发行

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